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★ THIS MONTH ★

TOM DALE, Editor

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HAWAII, our 50th State, ranks 47th in area, being slightly larger than the combined areas of Connecticut and Rhode Island. In population it ranks 44th, or an estimated 645,000 (July 1, 1959) exceeding N. H., Del., Vt., Wyo., Nev., and Alaska.

Unusual among world truck farming, Hawaii can produce eight or more vegetable crops in a year on the same acreage. The agricultural income per farm worker is 4th highest among the 50 States. Total agricultural production is 37th. In 1950, there were 5,650 farms of which 3,558 are less than 10 acres. Ninety-five percent of the cultivated land is devoted to sugarcane and pineapple production.

Principal industries are sugar, pineapple, tourism, livestock, coffee, and fish. Hawaii's sugar production per acre is the highest in the world equaling about 3 percent of the world's sugar production.

(Continued on back page.)

FRONT COVER.—Terraced and contoured truck and pineapple farms in the foreground with eroded wasteland and rangeland in the background on island of Oahu, Hawaii.

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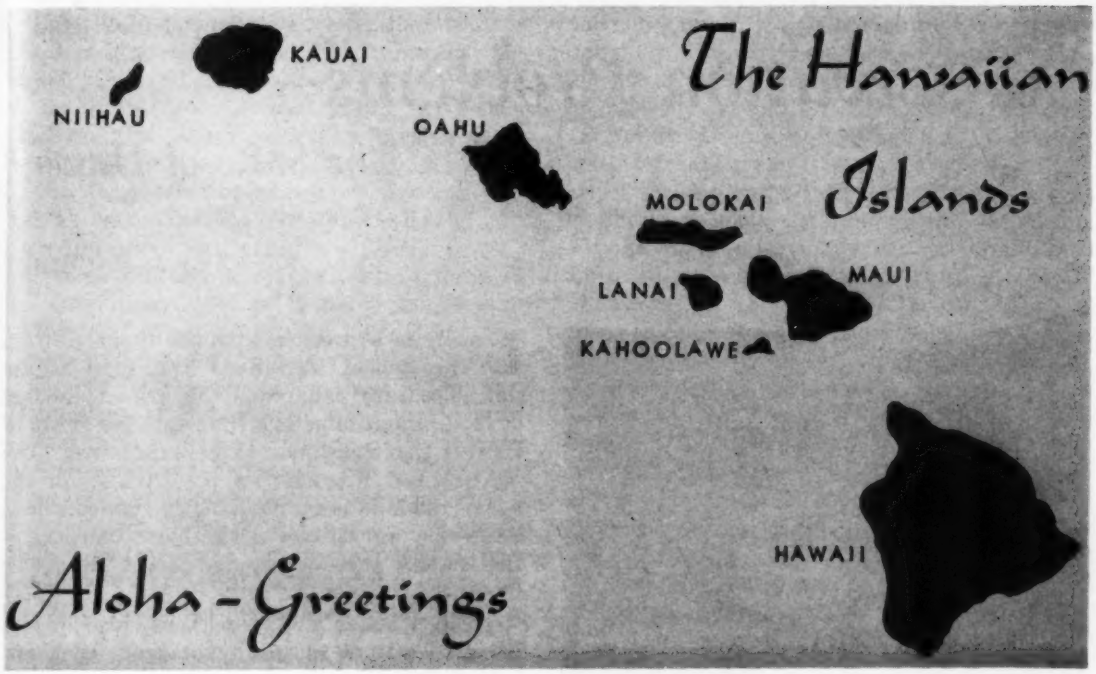


To Mainlanders from the State Association of Soil Conservation Districts of Hawaii.

By F. E. SCHATTAUER

ALOHA to all State Associations of Soil Conservation Districts, and their members, from the State of Hawaii Association of Soil Conservation Districts and its 16 member districts. Our State association was organized in 1954 and we have come a long way since that time. The farmers and ranchers who operate the State association take great pride in all phases of the progress made in developing an association which is alert to their needs in the new State of Hawaii.

With the complex soil and climatic conditions existing in the islands, the farmers and ranchers did not in many instances possess the technical "know-how" which meant the difference between success and failure. With the organization of the first soil conservation districts more than 10 years ago, economic improvement was soon observed in many areas.

The SCS technical staff assigned to the districts worked closely with the technicians on the plantations and ranches and with farmers. Their work was coordinated, new ideas were advanced, and many of them were soon put into use and considered a part of normal procedure on many of the sugar and beef operations and truck and fruit farms.

Renewed interest in ranching and farming is in evidence throughout the State of Hawaii. The introduction of new species of grasses and legumes, adapted to the various vegetative and climatic zones, enables us now to have lush green pastures at practically all elevations.

The State Association of Soil Conservation Districts of Hawaii extends friendly greetings to our mainland friends and invites them to visit our new State and observe many of the wonderful changes which are now taking place.

Note:—The author is president, Hawaii Association of Soil Conservation Districts, Kau, Hawaii.

Conservation Problems—

In The State of Hawaii

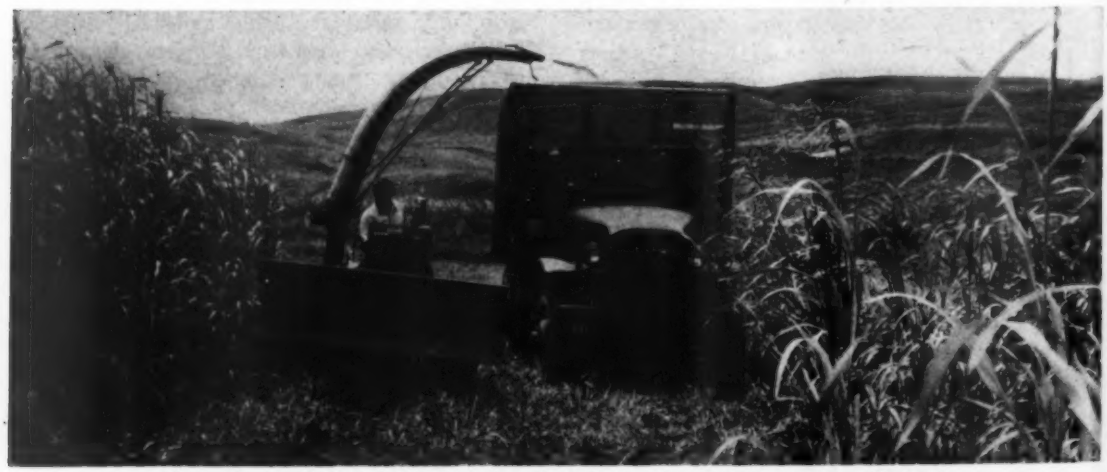
By J. H. CHRIST

Big trefoil grown as a cover crop in a coffee plantation.

LAND is a precious commodity in Hawaii. The ancient Hawaiians lived close to the soil. The taro patch was the primary source of food. Kamehameha III phrased the motto of Hawaii that continues to be expressive, "UA MAU KE O KA AINA I KA PONO," or the life of the land is perpetuated in righteousness. Even now agriculture is the basic industry of the islands, and a great number of the people live directly from the soil.

Today's sugar and pineapples provide the balance of trade of an advantageous economy. Livestock production, the coffee crop, exportable and locally used fruits, nuts, and vegetables also contribute importantly to the agricultural picture. Protecting the land while improving the methods of production is a key job for the conservationist.

Note:—The author is State Conservationist, Soil Conservation Service, Honolulu, Hawaii.



Harvesting sudan and alfalfa crop for silage in the Kau Soil Conservation District.

Present-day travelers between the islands of the Hawaiian chain obtain an expressive picture of the land. Nowhere is it seen so vividly as by the air route, which is almost the sole means of interisland passenger transportation. Green fields, windbreaks, wooded mountain slopes, deep lush tropical valleys, and rain forests all emphasize the intent to clothe the land with protective measures.

Storms still take too large a toll of the good soil from unprotected fields and from poorly or unvegetated range and forest land.

Conservation problems here cover a wide range of conditions, many of them within narrow ranges of climatic and elevational limits. Farmer and rancher members of the Islands' 16 soil conservation districts are working out these tough soil and water problems together—working as a team. The public also is giving good support to the program aimed at protecting and improving Hawaii's land and water resources. And no one realizes more than the people the strict limitation of the islands' lands and the need to keep them productive and able to feed their growing population.

Sugarcane is the chief money crop of the islands and occupies most of the cultivated area. Slopes range from almost level coastal lands to those of 80-percent slope in higher elevations. Irrigation is a necessity in lee sections of the islands having less than 55 inches of well-distributed rainfall. Some soils are very shallow, underlain with coral. Others are deep, friable, and highly permeable. Cane grown near sea level matures in about 18 months. Elsewhere, with increasing elevation, it may take cane upward of 46 months to mature.

These are some of the many and varied conditions found in producing a single crop. Landowners and conservationists run into varied conditions too in growing other crops such as pineapples, coffee, papayas, Macadamia nuts, mangoes, many truck crops, grasses, legumes, and trees that are adapted to this tropical area.

This gives you an idea of the tough job confronting land users and SCS technicians in using Hawaii's soils for their purposes and protecting them for long sustained profitable production.

Directors and cooperators of Hawaii's 16 soil conservation districts can be proud of the good conservation work they are carrying out on farms and ranches. Ranchers, farmers, sugar and pineapple plantation managers, and Soil Conservation Service technicians all have had a hand in applying soil and water practices and getting more and more conservation on the land.

Like mainland farmers, Hawaiians have a good many tough soil and water problems that call for expert technology. Drop in on some of

Dragline, owned by the East Kauai Soil Conservation District, digging a drainage ditch.

the islands' farms and ranches and you'll see their owners and SCS technicians in the field working out the answer to troublesome conservation problems.

Today, for example, they're designing structures to reduce damage from storms that dump upwards of 15 inches of rain in 24 hours, providing moisture-retaining cover crops for coffee trees growing in broken lava, and planning vertical drainage through watertight lavas to take off excess water. Tomorrow other conservation work may be needed.

A newcomer to this brand new island State finds more new and interesting features in farming here than in any similar size area of the United States.

Last year damage from torrential, high-intensity rains were effectively curbed where sugar plantations used diversion ditches, protected channel outlets, and stripcropping in their fields.

Papaya orchards often are hard hit by winds. Ninety percent of a full-bearing orchard may be destroyed by gusty winds that occasionally strike the islands. When orchards are protected by dense windbreaks of native ohia, special plantings of Norfolk Island pine, or swamp mahogany damage is light.

One large planting of acerola cherry, a high vitamin C crop, in the Puna SCD has an 11 mile, three-row planting shelterbelt of paper bark, a tree on the order of eucalyptus.

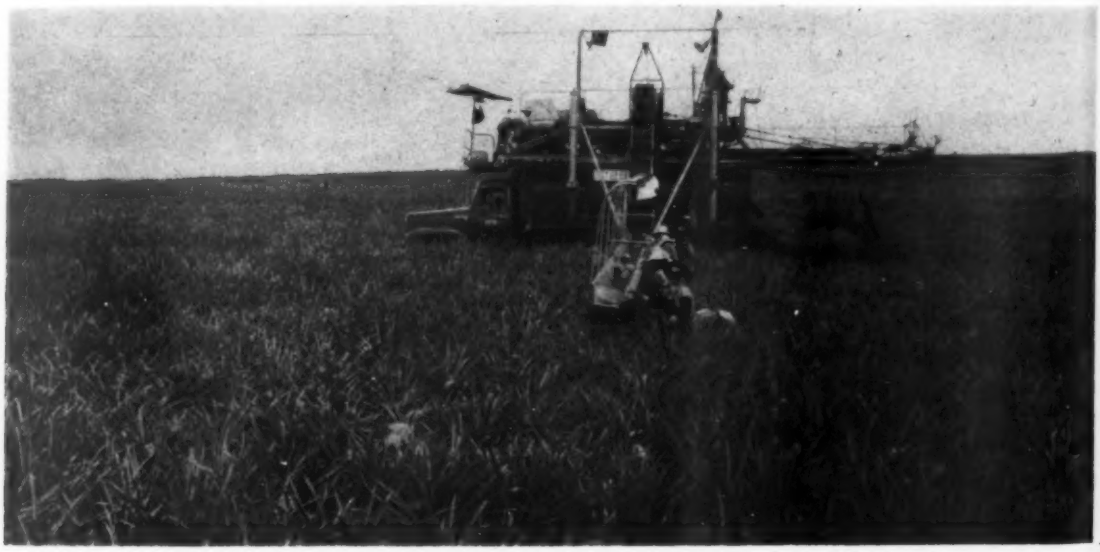
Cover crops are working out well in Macadamia nut, coffee, and papaya and mango orchards. Crotalaria, Spanish clover, and big trefoil are among the legumes used for this purpose. Cover crops of oats and vetch, a common mainland combination, is equally effective in the Waimanalo SCD on Oahu in protecting truck cropland during the critcial rainy period of December to February.

Mulches are also proving effective on open truck crops or other open fields. Mulches are made up of bagasse, the fiber from sugar mills after sweet juices are removed, chopped up Napier or other heavy stemmed grasses, parchment from coffee berries, sawdust, and wood chips. All are used when available to the farmers.

Fencing paddocks, providing adequate water, supplying important growth minerals, and fertilizing improved forages are key management practices with Hawaiian livestock operators as with their mainland counterparts.

Rotation grazing finds a special usefulness in capitalizing on a 12-month grazing season.

Harvesting pineapples in Hawaii.



This favorable situation calls for more conservation work such as eliminating woody invaders in pastures, keeping out undesirable weeds, and shifting livestock to areas where animals gain on strong forage in contrast to losing weight on washy feed.

Buffel and blue panicgrasses grow in the driest 10- to 20-inch rainfall areas; guineagrass and koa haole, a shrubby legume, in the 20- to 40-inch areas; kikuyu, bermudagrasses, and kaimi clover, a Desmodium, in the 40- to 60-inch grass belts; and in the 60-inch plus areas pangola dallisgrasses and big trefoil show excellent adaptation. Each of these plant-use groups have special seasons of use and a definite regrowth period for favorable production.

Although parts of Hawaii are credited with world records in rainfall, 624 inches in a 12-month period in 1948 on Waialeale on Kauai Island, other areas require irrigation almost the year around. We're seeing more sprinkler systems on farms and ranches in SCD's on Molokai, Kauai, and Oahu. Gated pipe is being used effectively to make good use of water supplies.

Redesigning irrigation systems likewise provides for more effective use of water in contrast to old outmoded, wasteful, high labor cost distribution systems. Many Hawaii soils are very permeable, so much so they are totally unfit for reservoirs. Sealing materials such as asphalt panels, plastic films, or sprayed on asphalts are proving very useful in making good use of limited and valuable water supplies.

Hawaiian pineapple field planted on the contour.

There's much more conservation work to do, but there is a firm, real desire by many Hawaiians to see that the lands of this Island Paradise continue to deserve the title. It is good to see the progress made in the last quarter century and to note the way many people are working to make Hawaii's lands safe and productive.

Laying asphalt membrane lining in irrigation ditch on Oahu, Hawaii.

Better Homegrown Beef . . .

For Hawaiian Consumers

By CARL L. SUNDQUIST

LAST year, for the first time, Hawaii cattle producers stopped the steady climb of beef imports to the islands. This reduction from a 1957 high of 18 million pounds to the 1958 total importation of 16.5 million pounds is the result of a determined effort by local producers to capture more of the expanding island market.

Today 60 percent of the beef marketed is of island origin. It is the attractive $7 million plus which still goes to mainland and foreign shippers that is the root of the Hawaii cattlemen's campaign for better beef.

The lower grades of beef have been largely supplied from local sources since the lifting of the "kapu" or taboo, which forbade the slaughter of cattle, following their introduction to Hawaii by Captain George Vancouver, the English explorer, in 1793. In the 30 years that the original stock were protected, numbers increased to such a point that the "kapu" was lifted and beef became an important island food.

Note:—The author is range specialist, Soil Conservation Service, Honolulu, Hawaii.

Hawaiian grown steers in a fattening lot.

Grade Hereford cattle grazing on 2-year old Kikuyu grass in the Kau Soil Conservation District.

However, not until the end of World War II was a change in meat tastes generally noticed. Perhaps it was the greater number of visitors to the islands, or the increasing population of the islands, many from the mainland, or it might have been the GI's who cultivated a liking for the superior grades of beef. But whatever the cause, the grass-grown cattle of the local producer failed to qualify for the fancy hotel trade and for the housewife seeking an attractive uniform cut of meat in the Choice and Prime U. S. grades.

Island producers hadn't quite anticipated this rapidly developing market change. But the handsome dollar package seen going to the import trade caused the local producers' organizations to quickly set their sights on a share of it. And hopefully they plan to pick up increasing amounts of it.

They are preparing to battle it out on the ground of pound-for-pound quality.

The Hawaii Meat Company in Honolulu, a cooperative of a number of the island's larger cattle producers, has designed Hawaii's first large-scale feeding operations. This is geared to market-feed 5,000 head of cattle at one time. Plans are to feed for 90 to 120 days to reach proper fleshing.

Island feeds figure strongly in the fattening diet for cattle. Around 120 acres of leveled coral land at Ewa produces green chopped alfalfa for cattle in the modern feeding plant. Here the entire operation is mechanical, including water systems, feed mills, grain and molasses tanks, cattle pens, scales, and cattle working facilities. Molasses from the sugar mills, pineapple bran, a byproduct of the pineapple canneries, and fish meal from the local tuna canning industry are mixed with imported grain to bring about profitable gains on the animals.

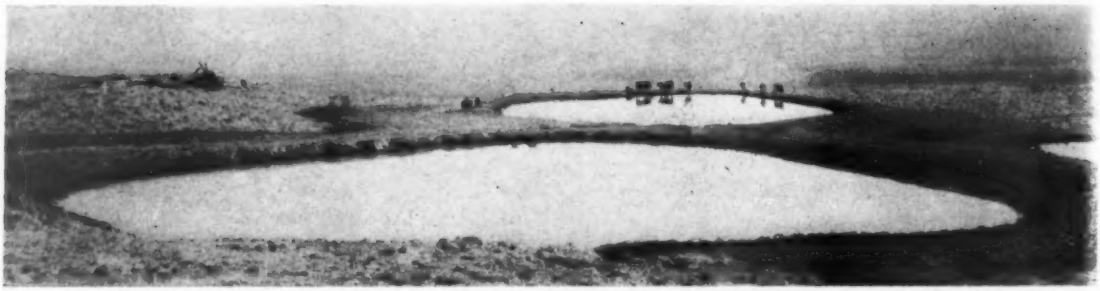
The Kahua Ranch, another important livestock handling company, likewise has set its sights on a fair share of the outflowing beef dollars. Imported grain again figures strongly in the special fattening diet.

It is expected that Federal grading will start this year to put the U.S. Choice label on island beef.

Several individual producers also have started feeding operations to groom their cattle for the fancy trade.

Almost a fourth of Hawaii's 4.2 million acres is used as range and pasture land. These lands are found at elevations ranging from sea level to about 7,000 feet and with rainfall from 20 inches on the lee sides of the islands to 150 inches and above in the rain forests.

There is no sure-fire way to success. The



Livestock watering ponds at 6,000 feet elevation in the Mauna Kea Soil Conservation District of Hawaii.

island producer finds that he must be just as critical and far-sighted in his operations as his mainland competitor. Choosing high producing, nutritious grasses and legumes for his conditions; providing fencing to give good distribution to the cattle and utilization of pastures; developing water for the pasture units; providing shade from the tropical sun where needed; and fortifying the cattle, particularly the breeding herd, with essential mineral elements to guarantee a high calf percentage are primary components in Hawaii cattle ranching.

Yes, Hawaii's 375 commercial producers say that they are going to have a fat slice of the almost $8 million now going to the purchase of imported fat beef by Hawaiian beef consumers. They have the facilities to bring the animals along rapidly to marketable age, and right now they are developing the facilities to round out the entire picture through the finishing stages.

Pasture Building

At the Kulani Security Camp, Island of Hawaii

By JAMES BUCHAN

ASK a mainlander today about the agriculture of our new State of Hawaii and more often than not he'll begin talking about sugarcane and pineapple. When it comes to cattle he probably thinks of the large white-faced herds of the West's wide-open spaces.

Hawaii isn't in it with the big beef producing States, but we believe we stack up pretty well in pasture building. Lands in our archipelago that once took acres and acres to graze a cow, now are feeding one or more head per acre. This is happening because more and more Hawaiian ranchers are clearing brushland, seeding better forage plants, and managing pastures the conservation way.

Note:—The author is soil conservation aid, Soil Conservation Service, Hilo, Hawaii.

You've got to hack your way through much of the brushy and wooded cover on these semi-tropical islands, just as Captain James Cook did when he landed in 1778. It has taken a lot of clearing to provide grazing room for cattle.

One of the tightest vegetated spots I've seen is high up on the volcanic slopes of Mauna Loa on the Island of Hawaii. Here in this jungle-like setting in Hawaii's Kulani minimum security camp is a story about a pasture that was literally carved from the rough.

The other day, Warden Charles Smith said, "We've gotten real good results from our pasture building. We raise more beef now and there's more steaks and chops for the men.

"To get grazing room and better forage we cleared around 270 acres in 1951. The seeding

we put in wasn't the best but we gained in feed. We needed more cattle and more feed, and in 1955 our new project farm manager, Manual Pacheco, began working with the Puna and Waiakea Soil Conservation Districts and Soil Conservation Service technicians assisting them.

"Our new pastures are turning out a lot of good feed. Most of them carry one head per acre now with better improved acres feeding two head per acre. That's on land that put out only skimpy feed a few years ago."

Since September 1955, SCS has helped Pacheco plan new paddocks and select grasses and legumes best suited to this 100-inch rainfall country.

Pasheco has worked hard at pasture building. So far he's cleared and seeded around 520 acres of brushy woodland. Another 250 acres were sprigged with pangolagrass and seeded to a mixture of big trefoil, orchardgrass, redtop, and crimson clover.

He fertilized the seeding with 16-20-0, using 200 pounds per acre every 3 months the first year.

The new pastures are divided into 40-acre paddocks and grazed in turn, 2 months on and 4 months off. Water troughs and pipelines are going in as soon as new grazing areas are developed.

On this good pasture and under good management, Pacheco is steadily building up the camps beef herd which includes 53 breeding cows, two bulls, twenty-five 2-year old heifers, thirty-nine 2-year old steers, and four cows in the fattening paddock.

Warden Smith likes the way pasture building is going at Kulani. Puna and Waiakea district directors point out the camp's good-looking paddocks as a showplace for other ranchers to visit.

◆

Seek better weather reports

A set of instruments now being designed in a soils physics laboratory at the University of Wisconsin may give the farmer of tomorrow much better information about his best friend and worst enemy, the weather. The scientists seek low-cost, easily-operated equipment which can be used to set up a network of agricultural weather stations to do a better farm weather reporting job at a reasonable cost.

Weather information gathered by present methods may not apply to farms located some distance away. Weather stations already set up do not record some kinds of information crucial to farm needs or give information applicable to small areas.

Clearing land for pasture on the Kulani Security Camp acreage.

Manuel Pacheco in 15 month old stand of pangola and trefoil.

Picture Report on Girl Scout City . . . .

A Mile High And World Wide

THE 10th largest city in Colorado appeared overnight on July 3, 1959. Literally encamped a mile high, it was to remain 10 days at the base of Pike's Peak and just across the highway from the U. S. Air Force Academy at Colorado Springs.

The Second National Girl Scout Senior Roundup lived in this city of 6,000 tents and had for its citizens the Senior Girl Scouts from all over the U. S. and from 27 foreign nations; hence, the theme for the roundup—A MILE HIGH AND WORLD WIDE.

The Soil Conservation Service provided a Soil and Water Conservation Exhibit, developed a Conservation-Nature Trail, and prepared the text for a booklet, distributed to each girl scout, on "Conservation DOs and DON'Ts and Observation and Activities." It was printed by the Colorado Association of Soil Conservation Districts and the Colorado State Department of Agriculture.

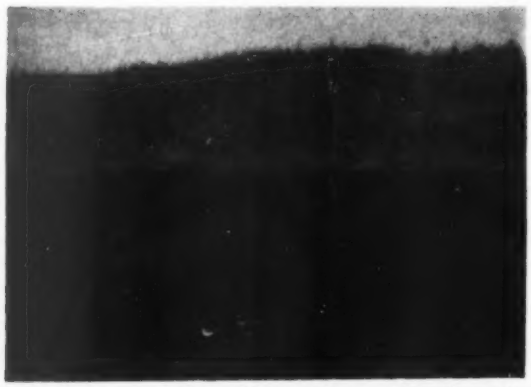
The roundup conservation-district hosts were the Central Colorado Fountain Valley and The Black Squirrel Soil Conservation Districts.

Eighty percent of the Girl Scouts and their leaders visited the two attractions at least one time and some made several visits. No record could be kept of the many roundup guests—parents and friends—who also visited the Trail and the Exhibit.

THE PICTURES

(1) Colors of 28 nations and the 50 States line the Avenue of Flags. Pikes Peak is in background. (2) U.S. Army sergeants explain construction of concrete crossing on campsite prior to encampment. (3) Great Plains winds do not help in pitching tents. (4) Soil and water conservation exhibit attracts crowds. (5) Girls learn the importance of grasses in conservation programs. (6) Clem Dodson, State soil conservationist, SCS, Denver, uses watershed model exhibit to explain water cycle. (7) Troop 446 of Peoria, Ill., explain their own watershed exhibit. (8) SCS technician points out what can happen when erosion gets a start in sandy soil. (9) Girls handle topsoil and subsoil and hear why it is droughty. (10) SCS technician discusses 3- and 6-year-old Ponderosa pines; note range terraces in background which prevent formation of gullies below them. (11) W.S. Caton, SCS work unit conservationist, Colorado Springs, explains about native grasses. (12) Girl Scouts view 120-year-old Ponderosa pine.

Lava flow before preparation for planting.



Pangolagrass and big trefoil growing on lava flow only 3 years old.

Clearing ohia-fern rainforest on Aa for crop production.

By ROY P. YONCE and
ROBERT C. MALMGREN

MOST American farmers would get a real shock if they had to begin growing fruits and vegetables in hardpan and bedrock. But many Hawaiians take rock farming in stride. They've been turning out crops on lava beds since long before Captain James Cook landed on their shores in 1778.

The Island of Hawaii is starting to make more use of its rocky land as a result of a continual desire of people to become landowners. Experience locally with such crops as Macadamia nut, coffee, and certain truck crops indicates the development of these lands for these crops is economically sound. The very fact that lava flows still occur on this island is one way of losing some of the good productive soil areas.

Note:—The authors are, respectively, work unit conservationist, Hilo, Hawaii, and soil scientist, Wailuku, Maui, Hawaii, both of the Soil Conservation Service.

Pahoehoe lava that has been fractured with a ripper in preparation for planting to coffee.

Farming Lava Beds

On The Island of Hawaii

This has, to some extent, put the "squeeze" on other lands.

In the Puna Soil Conservation District, on the Island of Hawaii, one-third of the farming is done on old lava beds.

Two major types of rocks occur as a result of lava flows: Aa, which is like cinders or clinkers and has a rough and broken surface; and Pahoehoe, which is massive bedrock with a relatively smooth surface. The type being used most successfully is the Aa. It occurs at depths up to 20 feet.

There are two major obstacles involved in development of such land for production: the cost of the land and the clearing. Much of this land, when it is available, sells for $150 to $200 per acre. This does not include a clearing and rolling operation, which costs about $150 an acre. Rolling consists of pulling a 26,000-pound roller behind a tractor to compact and make a smoother surface to facilitate harvesting operations later. There is not sufficient soil material to create poor drainage from this compaction.

This total cost would not be out of line for good land. However, an examination of the profile indicates about 90 percent rock (by volume) and a very small amount of soil material between the rocks. If you were to extract the soil material from a cubic foot of such land, the more choice spots would produce one cup of dry soil material. Hence, heavy fertilization is necessary to grow profitable crops. Takao

Raking debris following knockdown by bulldozer on Aa rainforest.

Young coffee and papaya trees on Aa land.

Niiya, manager of Farmers, Ltd., which produces coffee and papaya, applies about 3,000 pounds of 10-10-10 fertilizer per acre annually on the papaya. This is applied at the rate of nearly 400 pounds per acre eight times a year.

The problems of mulching, crop-residue utilization, and windbreaks are also serious. Obviously, one very important step is to increase, or at least maintain, the organic matter between the rocks for more efficient response to fertilizer. Windbreaks are used principally for plant protection as coffee, papaya, and the Macadamia nut can tolerate very little wind.

While this area receives 90 inches annual rainfall, occasionally the distribution is such that small, newly started plants may suffer from a lack of water. In an effort to combat such setbacks, Mr. Niiya recently asked SCS technicians to work with him on determining the cost of developing a supplemental irrigation system on this land.

Another big problem in this rock farming program is that it takes too long to get old lava flows in production. The way things were going until recently, several hundred years passed before organic matter formed and erosion broke down the lava beds.

Richard Lyman, agriculturalist and a director of the Puna district, started some tests on farming new lava beds, a few years ago. He believes his lava test plantings show that man can get the jump on Nature by hundreds of years by putting fresh lava in production soon after it cools.

Lyman started his nursery plantings in a small lava patch along the highway between the cities of Pahoa and Kapoho on Hawaii a year after Mauna Loa's last volcanic eruption in 1955. He used a spike or rooter to loosen the Aa soil, bulldozed to flatten and crush the soft, lumpy clinkers, then rolled the patch to pulverize and smooth it down.

In Aa, he picks out a foot square, foot deep hole for each planting. If lava isn't broken down enough, he adds a little soil so roots can take hold. In planting Pahoehoe, a smooth, solid lava, it's usually necessary to set holes with a drill or jackhammer.

Lyman fertilizes each planting, using a rule-of-thumb application of a pound of complete fertilizer for every inch of diameter of the plant. This treatment is a must in rock farming and is repeated four to six times a year to feed plants and offset leaching from the 80- to 100-inch annual rainfall.

The roadside plantings were made in 1956, right after the lava cooled, and included hala (screw pine), monkey pod (the rain tree), watermelon, plumeriagrass, pangolagrass, and others. As is the practice in rock farming, Lyman spread cane mulch or bagasse (crushed sugarcane stalks) around each hole to save moisture.

All of the plantings flourished and the watermelon grew two fruits. A lime tree seedling, which normally takes 4 to 5 years to bear, produced fruit in new lava in 2 years. And a planting of papaya, made in the fall of 1956, was judged commercially successful after a year's growth. Fruit is of normal size but not as soft as papaya produced by commercial growers, which Lyman says enhances its value.

One of his latest experiments with Aa farming was a seeding of corn, tomatoes, and other garden crops in 8 inches of topsoil spread over fresh lava. Results were only fair because of dry weather.

Does fresh lava stimulate plant growth?

Lyman thinks not. He says, "Until lava is weathered, eroded, and mixed with organic matter, it doesn't put out enough nitrogen, potash, and phosphate to feed plants.

Lyman tells visitors to his nursery, "It's too early to say how much production we'll get from fresh lava and we're not sure if it will pay to make large-scale plantings under these conditions.

"We do believe we have proved that farmers don't have to wait for Nature to change lava into topsoil. They can do it well enough with a dozer and roller in a few days to give plants growing room. The books have been telling us to let erosion do the job.

What has been considered wasteland for many years may hold the key to increased production in Hawaii. While the Island of Hawaii is the only island of the chain having any amount of this type of land, it has a large acreage. The Puna Soil Conservation District has at least 200,000 acres of such land. Although it presents problems in management, as does most other land, crops can be produced to help the economy of the State.

WHAT PRICE WATER?

Hawaiian farmers construct asphalt plank-lined reservoirs for storage of irrigation water.

By MERLE H. ARNOLD, JR.

Reservoirs are dug with a bulldozer, soil piled around the edges, leveled and smoothed. No sharp, cutting rocks are left protruding on the surface.

WHEN Yoshio Inouye built his first asphalt plank-lined reservoir in late 1957, little did he realize he was starting a trend—a trend in better water management, improved irrigation water distribution systems, and increased crop production for his community. Within the next 18 months, 24 similar reservoirs had been built in his district, the Olinda-Kula Soil Conservation District, and one in the West Maui Soil Conservation District, both on the Island of Maui, Hawaii.

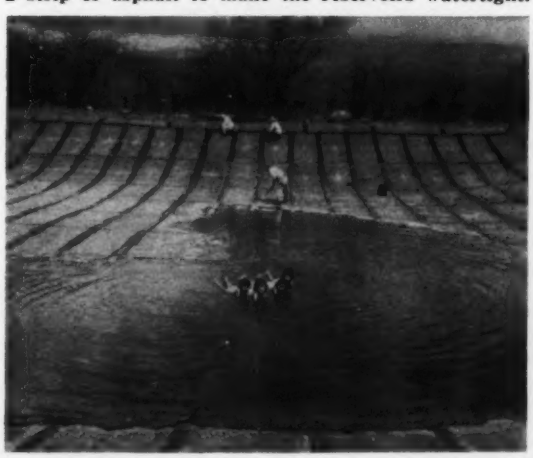
The 26 reservoirs impound over 4 million gallons of water. They have been constructed with cost-sharing from the Agricultural Conservation Program and technical assistance from the Soil Conservation Service. Many more reservoirs are planned under the 1959 progam.

Most of the Kula district is unique—even for Hawaii. The forest soils are high in fertility and are highly erodible when cultivated. The Kula Area lies between 2,000 and 4,000 feet in elevation and land slopes are steep, averaging about 15 percent. The climate is cool and the rainfall is relatively low, ranging from 20 to 50 inches annually. Temperate zone crops are raised, but production is limited by water. The irrigation water supply is from the Kula pipeline, which is primarily a domestic water supply system.

In times of drought, little water is available for irrigation. However, the water that is available can be put to more efficient use by accumulating a supply in a reservoir and irrigating from it. Water is generally applied to the land through sprinkler systems. Both water and labor are saved when a reservoir is installed and used.

The reservoirs were designed for two major purposes: to combat the water shortage at critical times during drought periods, and to assist the technicians, assigned to the district, design more efficient irrigation systems with constant pressures and quantities of water rather than the former inefficient systems with fluctuating pressures and amounts of water.

Asphalt planks, ½-inch thick, are laid and sealed with a strip of asphalt to make the reservoirs watertight.



Note:—The author is soil conservation aid, Soil Conservation Service, Wailuku, Maui, Hawaii.

Water reservoir lined with plank-type asphalt membrane, at a higher elevation than the fields to be irrigated.

Other important functions of the reservoirs are fire protection and emergency waters in case of line breaks or extremely low pressure periods.

It is necessary to line all reservoirs constructed in these soils, as most Hawaiian soils have high infiltration rates. The rates vary from less than 1 inch per hour to more than 20 inches per hour.

Asphalt-plank lining is the type that has generally been installed in Kula. Other types, including hot applied buried asphalt and shotcrete (thin concrete applied with a spray gun), have also been used in Hawaii.

The ½-inch thick asphalt-plank material has found favor because of ease in handling and ease of installation—inexperienced help can install it with little difficulty.

The reservoirs have performed satisfactorily to date. Little or no seepage loss is apparent and evaporation losses are low in the Kula district.

Contrary to the general practice prevalent on the United States mainland, where ponds are usually constructed in gullies and filled by surface runoff, reservoirs on Maui are seldom built in gullies.

Sites for the reservoirs are generally selected by SCS technicians assigned to the district. Location factors include stoniness of soil and underlying rock and elevation with respect to fields. Most of the reservoirs are installed on the higher land of the farm. Sometimes they are located lower because of excessive costs of excavation. For some reservoirs, blasting has been necessary.

In one case the farmer's choice of location was in a dry gulch. Little or no water had been carried down the gulch for 15 or 20 years because water is diverted by the highway above. However, the gulch sites are generally avoided in favor of the higher location sites.

Strange as it may seem to mainland readers, out here in the middle of the Pacific there are lands which can become quite arid, within sight of a vast ocean, and where irrigation water is in great demand. Sort of reminds us of Coleridge's "The Rhyme of the Ancient Mariner"—"Water, water everywhere, but not a drop to drink," except in this case it is sometimes "Not a drop to irrigate."

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Drake University summer class of 35 teachers conducted all 22 activities described in TEACHING SOIL AND WATER CONSERVATION—A CLASSROOM AND FIELD GUIDE, SCS publication available to teachers. Report on effectiveness of the activities is being prepared by the class.

The Greene District of Ohio

Supervisors and SCS Technicians Each Accept Own Responsibilities and Speed Up Progress of Conservation.

By W. H. LATHROP

"I'VE heard about our district program and how we won the Goodyear award. I've seen the work on my neighbor's farms. I want to take part in it."

That's Sam Harshman talking. He operates a 300-acre farm in the Greene Soil Conservation District in Ohio. There's nothing unusual about what Sam said. What is unusual is that 52 farmers who became cooperators with the district last year did so with the same spontaneous enthusiasm, mostly by coming to the office and leaving signed agreements with the district secretary.

Cooperative agreements between the district and the farmer are sometimes obtained only at the expense of a great deal of "supporting" activity by the SCS work unit staff. But the Greene district is rated one of the highest in the State in percent of time spent on direct technical assistance. "I didn't help in any way with the district's annual report last year," said Work Unit Conservationist David Kile. "Chairman Billy Gerard asked Robert L. Thomas to get it out, which he did. I didn't see it until it was finished."

Even the briefest review of all the Green district's activities described in the 1958 report would make this account too long. It tells of the cooperation and activities of nearly a hundred agencies and individual leaders. The board carried out 17 major activities which were scheduled at the beginning of the year. They include tours, field days, contests, forums, and exhibits. The 1959 schedule shows 30 dates on which contests, banquets, meetings, and other events will take place. The Green district is the only district in the State ever to win the Goodyear Award twice.

Note:—The author is information specialist, Soil Conservation Service, Milwaukee, Wis.

What is the source of the leadership which makes all these accomplishments possible? Kile credits much of it to a series of area meetings for supervisors started 10 years ago at the suggestion of SCS Area Conservationist Dan Buskirk. Buskirk had observed that so-called "natural leaders" among district supervisors were not always active leaders to start with. Farmers can learn leadership, he believed. The area meetings have proved that he was right.

Two or three meetings for supervisors in the eight-district area are held each year. District responsibilities, relations with other agencies, and the Memorandum of Understanding with the SCS are discussed. Floyd Heft, executive secretary of the State Federation of Districts, and Ray Brown, SCS State conservationist, have taken active parts in the meetings. But the supervisors don't only listen to speeches. At the February 1959 meeting, each board member made a talk on the responsibilities of the district board members and committee chairman.

With the Greene district board actively carrying on its program, Kile is careful not to encroach on district responsibilities. He refers all district business to the chairman. "When I attend a meeting where district business may come up, I arrange to have a board member there," he says. "I try to confine my work to furnishing the best possible technical service to the district."

There is an official document on the office wall which shows that Kile and Conservation Aid Thomas Ernstes are doing just that. It's a Certificate of Merit awarded Kile and Ernstes jointly, "For superior performance which led to high production in the Green Soil Conservation District."

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A Future Farmers of America soil conservation contest in the Clarendon Soil Conservation District, South Carolina, resulted in the district receiving 89 requests for help with conservation farm plans.

LEARNING BY DOING

VO-AG BOYS FIND THEIR OWN ANSWER TO CONSERVATION FARMING

By HAROLD F. RYAN

THERE is no point in using a blackboard for teaching when you have the whole outdoors for a classroom. That is the way Arthur Weiner, Vo-Ag instructor, looks at the job of teaching soil and water conservation at West Bend High School in Wisconsin.

For example, several years ago one of Weiner's students came to class and remarked that some farmer surely must be crazy because he was laying out crooked strips across his farm. This seemed to amuse most of the class, but Weiner said, "Let's see how crazy this farmer really is." He immediately took the group in a school bus out to the field, where they spent the next 2 hours examining the farmer's stripcropped land.

Note:—The author is work unit conservationist, Soil Conservation Service, West Bend, Wis.

Using a soil auger, they made borings in the middle of the slope, finding only 4 to 5 inches of topsoil. Then they took borings at the base of the slope and found deposits of 15 to 16 inches of topsoil. This simple demonstration convinced the entire class that the farmer was using good judgment in establishing contour strips on his sloping fields.

There are many other examples of Weiner's direct approach. Four years ago, his students built their own tree planter because no tree planters were available in the county. As a result, tree planting increased from 8 acres in 1956 to 95 acres in 1959 on farms cooperating with the local soil conservation district.

Weiner persuaded the West Bend High School District to buy a rundown, sandy 55-acre farm near West Bend which the Vo-Ag students

Art Weiner points out evidence of erosion to his Vo-Ag students at a terracing demonstration.

have since planted to trees. The farm was placed in the Soil Bank and the school district collects an acreage payment each year.

Each spring and fall Weiner arranges for his classes to assist with the actual layout of conservation practices, such as waterways, contour stripcropping, and terracing on one of the students' farms. The work is done in cooperation with Soil Conservation Service technicians.

Correct use of land depends on knowing its opportunities and limitations, Weiner feels. His philosophy is that his students should be given as much training in land judging as possible to give them a better understanding of land capabilities. West Bend enters teams in state and national land judging contests each year. In 1957 they won the Wisconsin Vo-Ag Land Judging Contest.

Weiner also spearheaded land judging in southeastern Wisconsin by encouraging area land judging contests and getting other Vo-Ag teachers to participate.

Use of "live" examples and learning by doing pays off in added enthusiasm, Weiner thinks. His boys also come to realize that to be truly successful farmers, they must know and use conservation methods. There is no other way.

Arthur Wiener is a vocational-agriculture instructor who uses the outdoors as a teaching laboratory. His boys dig in the dirt and learn modern conservation methods by putting them into effect.

Aerial view of contour strips laid out by Vo-Ag students of West Bend High School.

DISTRICT PROFILE

FRED E. ALLEN of NEW HAMPSHIRE

A man who raises eight fine sons on a New England farm in space-age America pretty well expresses thereby his faith in the future of soil and water. And the big, happy family at Alfarm, near the town of Durham, N. H., is no doubt Fred E. ("Doc") Allen's outstanding conservation project.

Along with what good-humored Doc describes as "pitching for my nine," he serves as chairman of the local soil conservation district and president of the State Association of Soil Conservation District Supervisors. His other duties as station veterinarian at the University of New Hampshire involving care of the University livestock, adviser to 25 to 30 pre-vet students, mastitis research, teaching, and manager of four small farms that furnish extra grass for hay for his own farm-make him one of the busiest men in Northeast agriculture. Active in community affairs, Doc is now serving his 13th year on the local school board.

His ability to keep activities constantly popping like firecrackers all around him made Doc the popular choice to lead the Granite State's SCD organization. Much sought after as a speaker for his dry, quiet wit, he has a unique way of impressing all farm groups with the vital importance of the task.

Frequently, he illustrates his points with anecdotes drawn from family experience. Take his method of rousing the boys in the morning; he posts a list of farm chores for the day. The first boy out of bed gets first choice; the second riser, second choice; the other boys, whatever jobs are left by the earlier risers. Naturally, the tardiest riser is likely to inherit the least agreeable chore.

"Somehow", says the Doc, "I think this could also apply to the soil conservation movement. We've got to move fast and smartly, or the job we'll get will not only be unpleasant—it will also be tragically late."

In Allen's own Strafford County SCD, they're closing in rapidly on the spreading "rurban" problem. The key to it is a land-use-change study embracing trends in the past decade. The effect of sprawling roads, housing, shopping centers, drive-ins, and other impacts of the population boom will be an eye-opener, Doc Allen believes. When fully revealed, he hopes it will spur action toward sounder controls of soil and water.

To do a better job of programing soil conservation, Allen and other leaders advocate stronger financial backing for the State Soil Conservation Committee. He also believes in close working relationships between district leaders and their technical advisers, the SCS men stationed in 10 county work units. He recommends ordinancing such land-use problems as topsoil removal and the digging of gravel pits. He feels the program should develop strong wildlife and recreation phases in appealing to cityfolk and owners of small properties.

The authoritative ring of Doc Allen's public utterances is no accident. He, Mrs. Allen, and the boys have run a vigorous conservation program at Alfarm for 12 years. Assisted by SCS planning, they've corrected wetness and multiplied productivity on 40 acres of grassland. The result is an excellent system of "machine-able" open drains and waterways.

They pushed juniper and rocks out of 6 acres and seeded a ladino hay-pasture. They removed stone walls to create one easily managed field

Fred E. Allen.

where once there were three difficult ones.

Doc and the boys have recently harvested 17,000 board feet of lumber by selective cutting. From this lumber, a 40 x 48 foot machinery storage shed was built by the Allens. They are now in the process of constructing a new barn for 32 milking cows. This barn will be ready for use in the fall of 1959. Milkers commonly number around 25, the majority of which are registered Holsteins although the Allens are aiming toward 30-plus. The herd has been outstanding for many years and last year was third from the top in the county, according to DHIA production records.

Mindful of a recent dry summer spent hauling barrels of water to the cattle, the Doc has a pond lined up for construction in the immediate future.

The future of soil conservation and his family both rank high in Doc's enthusiasm. While helping to plan the years ahead for his State's resources, he sees at the same time a bright horizon for his boys. Ranging in age from 4 to 23, three are presently in college—two headed toward engineering, one toward veterinary medicine. One lad in high school shows real interest in dirt—farming. Three are sprinkled through the elementary grades. The 4 year old is Mrs. Allen's constant man-around-the house.

"Since I'm a 'college prof', I suppose some folks thing I'm a hobby farmer," says Doc with a twinkle in his eye. "Usually, by the time I get through naming off the members of the Allen household they decide no man could make it a hobby with a brood like mine."

Farming, the Doc convinces his fellow Granite Staters, is a mighty serious business, and soil conservation even more so.

—FLOYD V. BARKER

Approximately 3.1 million acres were damaged by wind erosion in the Great Plains last winter and spring—0.6 million less than in 1957-58 and about one-third of that damaged in 1956-57.

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The Utah State Land Board is cooperating with local soil conservation districts and the Soil Conservation Service in improving range management on State lands.

REVIEWS

GRASSLANDS. By Howard B. Sprague. Illus. 424 pp. 1959. Pub. 53 American Association for the Advancement of Science. The Horn-Shafer Co.: Baltimore, Md. $9.

AT the 1956 meeting of the American Association for the Advancement of Science, the program for Section O included a Symposium on Grassland in our National Life. This book contains 37 of the papers presented at this symposium.

The papers were prepared by well-known authorities in the United States who have a comprehensive knowledge of the various aspects of forages and their management. A list of references is also included for each paper. The information constitutes a detailed review of present knowledge, which should be helpful to people interested in the improvement and use of grasses and legumes in American agriculture.

Eight major subject matter aspects relating to grasses are included: Sciences in grassland research; production in the temperate humid regions; engineering; utilization and related nutrition problems; evaluation of the nutritive significance; climatology; ecology; and range management. Four or five papers are included in each of these major sections and present the latest knowledge of the many facets relating to the Nation's grasslands.

All of the articles should be of interest to agronomists and livestock men interested in the use and management of the nearly 800 million acres of grassland. Of special interest to conservationists are articles dealing with the use of grass in the humid regions and the management of the vast acreages of rangeland.

—B. D. BLAKELY

Glass Fertilizers

Fertilizers made from glass are now being used in Florida to prevent rapid leaching from the soil, according to H. W. Winsor, assistant chemist with the Florida Experiment Station. Six of the minor elements (boron, copper, iron, manganese, molybdenum, and zinc) can be incorporated into a glass fertilizer containing silicates.

HAWAII

(Continued from page 74)

The area of farm and in principal crops, in square miles: sugar—346, pineapple—120, grazing land—1,574, forest reserve land—1,875.

Since the economy of the islands is dependent mainly on the agriculture of sugar and pineapple, they provide the trade balance between imports and exports. Imports from the mainland amount to $460 million and include; food (nearly two-thirds), raw materials, construction materials, clothing, appliances, cars, trucks, machinery, drugs, cigarettes, and other items. Foreign imports include fertilizers, newsprint, lumber, feed, and other products. Exports amount to $251 million and include sugar, pineapple, coffee, canned fish, flowers and foliage, hides, fresh pineapple, papaya, and other products. The tourist trade helps compensate for the difference between imports and exports.

The area of the islands is 6,434 square miles or 4,119,227 acres, divided as follows, in acres: The Federal Government's military establishments—317,012; State of Hawaii—1,415,684; cities and county governments—10,809; private ownership—2,373,722.

In the general election on November 6, 1958, 88 percent of the eligible voters cast their ballots attesting to the civic consciousness of the people of the State of Hawaii.

—RUTH A. FRIES

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I consider the soil conservation districts movement one of the most important developments in the whole history of agriculture. It has proved even more effective, I am convinced, than we had dared to expect.—Hugh Hammond Bennett in THE HUGH BENNETT LECTURES, published by Agricultural Foundation, Inc., North Carolina State College, Raleigh.

Soil Conservation in the Rural Development Program

More efficient use of land resources is a partial answer to the fuller local utilization of unused human resources, the goal of the Rural Development Program, according to Chas. N. Shepardson, Member, Board of Governors of the Federal Reserve System.

In a talk before the West Viriginia Bankers Association last summer, Governor Shepardson asserted that the problem is made up of "a series of local community problems, the solution of which depends primarily on local community action."

One of the opportunities for action, he suggested, is to put eroded cropland back into grass or timber. "This would not only help to maintain and rebuild the land but, in this day of widespread concern about domestic, industrial, and agricultural water supplies, it would go far in furthering a program of water conservation," he said.

Speaking of the Rural Development Program as a whole, Governor Shepardson said, "I can think of no previous program so directly oriented toward solving the basic problem of low income farm families and of the small towns and rural communities that are dependent on them for their existence."

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More than 3,600 students in Natchitoches, La., saw soil conservation movies and heard a discussion of soil and water resources as a result of an educational drive spearheaded by Mrs. Samuel Levy, conservation chairman of the Louisiana Federated Women's Clubs of America.

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Cooperating with the Bureau of Public Roads, SCS now includes a section on engineering properties of soils in soil survey reports.